FY 2018 Year 4 Extension Annual Performance Document

Oklahoma Space Grant Consortium Lead Institution:

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Telephone Number: 405 744-5900
Consortium URL: http://spacegrant.oknasa.org/
Grant Number: NNX15AK02H

Lines of Business (LOBs): NASA Internships, Fellowships, and Scholarships; STEM Engagement; Institutional Engagement; Educator Professional Development

A. PROGRAM DESCRIPTION:

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Oklahoma Space Grant Consortium is a Designated Consortium funded at a level of $760,000.00 for fiscal year 2018.

B. PROGRAM GOALS:

OSGC NASA INTERNSHIPS, FELLOWSHIPS, SCHOLARSHIPS (NIFS) GOAL: *To use the NASA mission, facilities, human resources, and programs to provide information, experiences, and research opportunities for students at all levels to support the enhancement of knowledge and skills in the areas of science, technology, engineering, and mathematics.*

Objectives to meet Fellowship Goal:

NIFS-1: Educate students at all levels by encouraging and supporting STEM research experiences and education programs.

NIFS-2: Provide support to the science and technology workforce pipeline by including greater participation of individuals who are underrepresented in science, mathematics, engineering and technology, in NASA student programs.

NIFS-3 Increase the number of NASA student support opportunities through partnerships and industry collaboration and cooperation.

OSGC HIGHER EDUCATION GOAL: *To support Higher Education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related* careers.

Objectives to meet Higher Education Goal:

HE-1: Award competitive grants/fellowships to faculty and students to facilitate hands-on learning related to integrated education applications of science, technology, engineering, and mathematics for use in student learning activities.

HE-2 Provide access to and promote utilization of NASA-related materials and information resources

HE-3 Increase the number and diversity of students and faculty from underrepresented and underserved communities in NASA-related STEM fields.

OSGC RESEARCH INFRASTRUCTURE GOAL: *To establish OSGC as a valuable State resource and catalyst for aeronautics and space-related research, education, and state economic and workforce development.*

Objectives to meet Research Infrastructure Goal:

RI-1: Create and foster opportunities for faculty and student research at all OSGC affiliates in areas related to NASA's strategic interests.

RI-2 Develop and foster interdisciplinary programs to assure the development and transfer of publications in aeronautics and space-related research and education.

RI-3 Develop linkages between Oklahoma aerospace industry, researchers, and students that foster the creation of market driven technology products.

OSGC PRECOLLEGE GOAL*: Increase the number of teachers and students, especially those in underserved and underrepresented communities, who are involved in NASA-related education opportunities.*

Objectives to meet Precollege Goal:

P-1 Develop opportunities for elementary, middle school and secondary education teachers to learn effective use of NASA-content, STEM based, materials and programs in the classrooms.

P-2 Introduce precollege students to NASA interest areas to encourage an interest in STEM disciplines.

OSGC INFORMAL EDUCATION GOAL: *Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research and exploration missions.*

Objective to meet Informal Education Goal:

IE-1 Provide instructional materials and technologies derived from NASA research and scientific activities that meet the needs and requests from within the community.

C. PROGRAM/PROJECT BENEFITS TO PROGRAM AREAS:

- A team of students designed and built a rover for competition at the NASA Human Exploration Rover Challenge event at Marshall Space Flight Center. The team finished in 6th place in the collegiate division.
- Oklahoma Space Grant hosted the 8th annual Speedfest aircraft design/build/fly collegiate event along with other industry and government partners. Over 200 teachers and students participated. College students flew turbojet powered RC aircraft, and high school teachers and students built and raced propeller aircraft. Over 1000 spectators also attended.

D. PROGRAM ACCOMPLISHMENTS:

- NASA Internships, Fellowships, and Scholarships (NIFS):

NIFS-1: **147** students were awarded Internships, Fellowships, or Scholarships at all college levels from Freshmen to PhD candidate. **5** Freshmen, **35** Sophomore, **46** Juniors, **56** Seniors, **1** Masters level, and **4** PhD level.

NIFS-2: **66 (45%)** of all awards were to underrepresented groups. **28** (**19%**) awards were to Native Americans, **28 (19%)** African American, and **10 (7%)** Hispanic. **87 (59%)** of the awards were to females.

NIFS-3: **6** awards were specifically to support students working on research at NASA Centers, or with industry or other research organizations. 3 students from Southern Nazarene University worked on a project in Russellville, AR, 1 Southwestern Oklahoma State University undergraduate was supported for research at Glen Research Center, while two were interns at Kennedy Space Center.

- Higher Education projects:

HE-1: **8** hands-on experience programs were conducted and/or supported by OSGC for students. These include: Mission to Planet Earth (MTPE), NASA XHab, Speedfest, GIS Day, NASA Rover Challenge, First Robotics, OSU Rocket Team, and Rock-On Sounding Rocket Launch at NASA Wallops Island.

HE-2: **1** OSGC program is designed specifically to promote utilization of NASA, and NASA-related materials and information for teachers in the classroom: MTPE

HE-3: A total of **102** awards were given, **52**(**51%)** of direct awards to students were to underrepresented groups, and **46 (45%)** to females.

- Research Infrastructure projects:

RI-1: **5** OSGC affiliates participated in Research Infrastructure programs. Although all do not participate through funding on the RI budget line, many have programs where students are supported to work with a faculty member on a research experience through scholarships and fellowships. A Total of 17 awards were given consortium-wide.

RI-2: **10** peer-reviewed publications of research directly attributed to OSGC activity were published; 38 non-peer reviewed papers directly attributed to OSGC were presented,.

- Precollege projects:

P-1: Focusing on inquiry-based strategies, STARBASE delivered multi-day STEM hands-on, minds-on educational classroom opportunities (grades 5-8) for 65 in-service teachers, with indirect impact on 9 schools and 1,625 students in underserved and underrepresented communities. These included rural and Native American communities.

P-2: STARBASE Summer Career Days Program reaches over 2,500 fifth through eighth grade students at seven locations across the state to introduce them to STEM Careers.
Langston University and Cameron University both offer a ten day summer precollege academy which serve 49 middle and high school student. Students engage in hands-on activities designed to introduce the concepts of nanotechnology, robotics, chemistry, and physics

- Informal Education projects:

IE-1: STARBASE 2.0 is an after-school STEM hands-on program for students in grades 6-8. STEM projects included a variety of NASA-related STEM topics such as aviation and flight, robotics, rockets, simple machines, radio-controlled airplanes, drones, CAD projects, Rube Goldberg designs, engineering design process activities, and coding. The project served 145 students at nine after-school programs across the state.

The Center for Spatial Analysis at the University of Oklahoma sponsors GIS Day at the

Capitol, an opportunity to showcase work in geospatial science and technology from across the state of Oklahoma to state legislators and others at the Oklahoma State Capitol.

Outcome #1 (employ and educate)

- 46 students took next step in the 2018 reporting year
  - 15 are pursuing advanced degrees in STEM disciplines
  - 1 accepted a STEM position at a NASA contractor
  - 16 accepted STEM positions in industry
  - 1 accepted a position at NASA
  - 3 accepted STEM positions in K-12 academia
  - 2 accepted STEM positions in academia
  - 8 went on to positions in non-STEM disciplines or had unknown next steps

E. PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE GOALS:

- **Diversity**:
  - OSGC is comprised of 16 affiliates: 3 universities through PhD, (1 of which is an HBCU, Langston), 5 universities through Masters, (1 of which is a MSI, Cameron), 2 community colleges, 1 Academic affiliate, 2 Industrial affiliates, 2 Informal Science Education Affiliates, and 1 city government affiliate. All affiliates actively participate in the goals and objectives of the OSGC.
  - 123 (46%) of all awards were to underrepresented groups. 62 (23%) awards were to Native Americans, 39 (15%) African American, and 22 (8%) Hispanic. 144 (54%) of the awards were to females.
  - 8 of the 9 (89%) 2018 Mission To Planet Earth (MTPE) participants were female. 1 (11%) of these participants was Native American. In addition, the Education Coordinator and lead for this project is both female and Native American.

- **Minority Serving Institution Collaborations**:
  - At Langston University, students majoring in the STEM areas in biology, chemistry, mathematics and technology were selected to conduct research at minority institutions of higher education. Mississippi Valley State University, Tuskegee University, Clark University, Howard University, University of Central Arkansas, Texas Southern University, and Muscogee College of Nations hosted the student researchers.
  - MTPE: An integral part of Mission To Planet Earth is participants from each of our affiliate universities. Two of these universities are considered minority-serving institutions, Langston and Cameron.

- STARBASE: Conducted a one-week summer Cherokee Nation STARBASE STEM Program Camp at Sequoyah Schools in Tahlequah, OK, for Native American pre-college students. This is a Native American school serving Native American students representing 42 tribes and 14 states.

- **Office of Education Annual Performance Indicators**:

  - API 3.3.3: STEM-18-1
    - **158** significant direct awards presented to higher education students across all institutional categories. **28 (18%)** were awarded to students at tier 1 research universities; **118 (75%)** were awarded to students at regional universities; and **12 (8%)** were awarded to students at community colleges
    - **63 (40%)** of significant awards were to underrepresented groups
    - **79 (52%)** of significant awards were to females
  - API 3.3.5: STEM-18-5
    - **10** Peer reviewed publications/paper presentations
    - **38** not peer reviewed publications/paper presentations

F. IMPROVEMENTS MADE IN THE PAST YEAR:

- Simplification of reporting to reduce workload on affiliates
- Our NASA Educator Resource Center renovation is nearly complete, which will be a source for NASA-related information for teachers throughout the state.

G. CURRENT AND PROJECTED CHALLENGES:

- We are having some minor challenges with the transition to the new Director/ PI and lead institution due to the two yearly extensions. We originally planned for the transition to happen at the end of the third year, which would have been complete now, but the two extensions have resulted in us having the Space Grant contract still at OU, with all new EPSCoR contracts going to OSU. We still think this is easier that asking for a change of lead institution on the existing contracts since it would require a change in contract number and movement of funds. This challenge will go away once the new multi-year is awarded, and all contracts will be at OSU with the PI as Andy Arena. We just want NASA HQ to be aware and ask for patience and guidance if necessary.

H. PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION:

University Affiliates

Oklahoma State University – Lead Institution
Cameron University – an MSI
Langston University – a Historically Black College and University
East Central University
Redlands Community College

Southeastern Oklahoma State University
Southern Nazarene University
Southwestern Oklahoma State University
Tulsa Community College
The University of Oklahoma

Academic Affiliates

South Central Climate Adaptation Science Center

Industrial Affiliates

Frontier Electronic Systems Corporation
Science Applications International Corporation
Informal Science Education Affiliates
Stafford Air & Space Museum
STARBASE Oklahoma

City Government Affiliate

Norman Economic Development Coalition